Alberta Health

Seasonal Influenza in Alberta

2013–2014 Season

Surveillance and Assessment Branch

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Executive Summary

The 2013-2014 influenza season in Alberta was intensive with a dramatic peak in cases and increased illness in working age adults and children under the age of five, but decreased illness in the elderly. While a similar number of Albertans were diagnosed with influenza in emergency departments (ED) and general practitioner (GP) office visits (30,089) this season as compared to the 2012-2013 season, the number of visits during the peak was 25 per cent higher than last season.

There were 3,914 lab-confirmed cases of influenza reported to Alberta Health this season, 35 per cent more than the previous season. Influenza A(H1N1)pdm09 was the predominant circulating strain in the 2013-2014 season, unlike the previous season where Influenza A(H3N2) was the predominant strain. The result of this was an intense influenza season with increased illness in working age adults and children under the age of five. In contrast, the rate of hospitalization among elderly adults was half that of the previous season, and the number of outbreaks in long-term care and supportive living facilities was less than half that of the 2012-2013 season.

In the 2013-2014 season, there were 1,219 individuals hospitalized with influenza, 248 more than the previous season. The rate of hospitalization, ICU admission, and death was closely tied with age. The median age of hospitalizations (51.7 years), ICU admissions (52.1 years), and deaths (59.4 years), was statistically significantly different than the 2012-2013 season. The rate of hospitalization in working age adults and infants under the age of one year was almost twice that of the previous season, while the rate of hospitalization in elderly adults was almost half that of the previous season. This is to be expected as elderly individuals have likely experienced multiple waves of H1N1 influenza A viruses and likely have residual immunity[10].

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Introduction

The 2013-2014 influenza season in North America began earlier than usual and was considered intensive with influenza A(H1N1)pdm09 predominating[1]. As a whole, there was increased illness and mortality in North America, especially in younger age groups[1]. Influenza A(H1N1)pdm09 was the predominating strain, resulting in activity levels and hospitalizations as high as the intensive 2012-2013 season, although targeting a younger age group[1,2].

Ninety nine per cent of all influenza isolates analyzed by the National Microbiology Laboratory (NML) were antigenically similar to the strains recommended by the WHO for the 2013-2014 influenza vaccine[2]. The components included in the 2013-2014 northern hemisphere trivalent vaccine were: Influenza A/Texas/50/2012-like virus (H3N2), Influenza A/California/07/2009(H1N1)pdm09-like virus and Influenza B/Massachusetts/2/2012-like virus (Yamagata lineage). Ninety-seven per cent of influenza B isolates characterized by NML were of the Yamagata lineage and three per cent were of the Victoria lineage.

This season was notable for the identification of a fatal case of influenza A(H5N1) in an Alberta resident who had travelled to China[3]. Influenza A(H5N1), first described in China in 1996, has caused outbreaks in poultry and has been identified sporadically in wild birds in Asia, the Middle East, Europe and Africa[4,5]. There have been 667 cases identified since 1997 in humans in Asia, the Middle East, Africa, and now one in Canada[4,5]. The WHO considers the risk of community-level spread of influenza A(H5N1) as low because it does not appear to transmit easily between people[4].

This season was also notable for a second wave of H7N9 avian influenza in China, in which H7N9 was identified in five additional provinces including Guangdong and Hong Kong[6,7]. There were a total of 450 cases as of June 17, 2014[8,9]. There has been no sustained transmission of H7N9 between humans and all cases have been in residents of or visitors to China[8]. There have been no cases of H7N9 reported outside of Asia.

This report describes the 2013-2014 influenza season in Alberta. While influenza surveillance in Alberta occurs year round, this report includes surveillance of influenza activity from August 1, 2013 (Week 31) to July 5, 2014 (Week 27) (See Appendix for weeks and date ranges for the 2013-2014 season).

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Influenza Activity in Alberta

The influenza season in Alberta was similar to that in the rest of the country: it was an intensive season that started sooner and peaked earlier than recent years, although it followed a similar trend to the 2012-2013 season (Figured 1 and 2). There were 30,089 Albertans diagnosed with influenza during the 2013-2014 influenza season: 23,178 were diagnosed in general practitioner office visits and 6,657 in emergency departments. While a similar number of cases were diagnosed in 2012-2013, the number of ED or GP visits during the 2013-2014 peak was 25 per cent higher than the 2012-2013 peak. The peak of ED visits in 2013-2014 was between week 52 and week 2 with 3,593 visits and the peak of GP visits was between week 1 and week 3 with 5,041 visits. The peaks may be shifted due to the differential operating hours between GP offices and EDs during the Christmas holidays. The peak of ED visits in 2012-2013 was also between week 52 and week 2 with 2,471 visits, and the peak of GP visits was also between week 1 and week 3 with 4,479 visits.

Note that while the past two seasons have been intensive, the number of cases diagnosed during the 2009-2010 pandemic season was almost three times higher and the number of ED and GP visits at the peak was almost seven times higher, when 62,271 individuals diagnosed at GP offices and 21,332 individuals diagnosed in EDs. There were 59,146 GP and ED visits during the three-week peak between week 43 and week 45. The proportion of influenza-like illness (ILI)[10] reported by sentinel physicians and lab-confirmed cases showed a similar pattern with the number of cases similar to or more intense as the 2012-2013 season but much smaller than the 2009-2010 pandemic year (Figure 3 and Figure 4) (2009 data not shown).

There were 3,914 laboratory-confirmed cases in 2013-2014, for a rate of 97 per 100,000. The majority of cases were due to Influenza A(H1N1)pdm09 (76 per cent), three per cent were due to Influenza A(H3), nine per cent were influenza A that was unable to be further subtyped, and 12 per cent was due to Influenza B (Figure 4). This is in stark contrast to the 2012-2013 season where 56 per cent of isolates were due to influenza A(H3), 13 per cent were due to influenza A(H1N1), and 27 per cent of cases were in a low but extended peak of influenza B.

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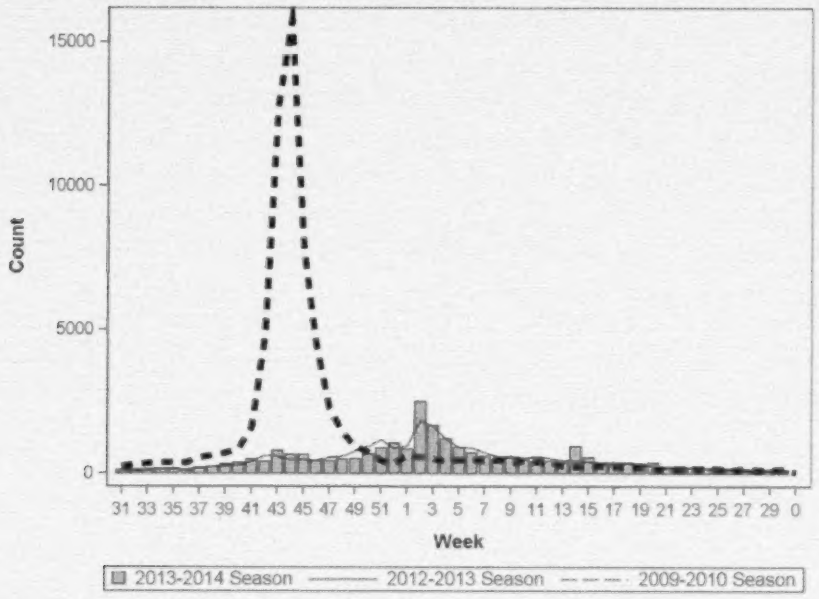
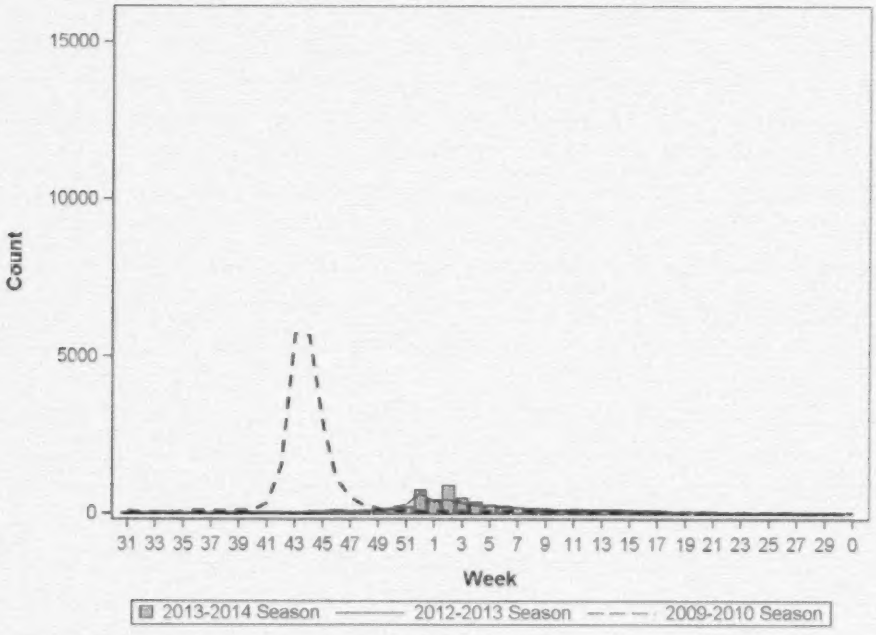
Figure 1: Individuals diagnosed with influenza in general practitioner offices, by season.



Source: Supplemental enhanced service event (Physician Claims)

Figure 2: Individuals diagnosed with influenza in emergency departments by season.



Source: Supplemental enhanced service event (Physician Claims)

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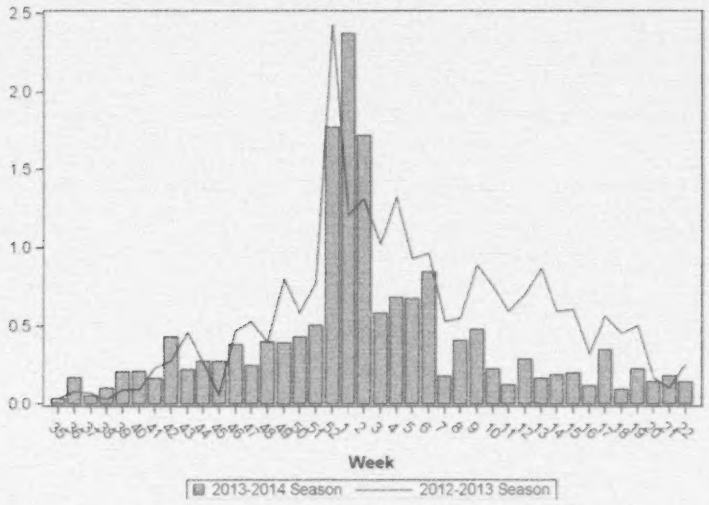
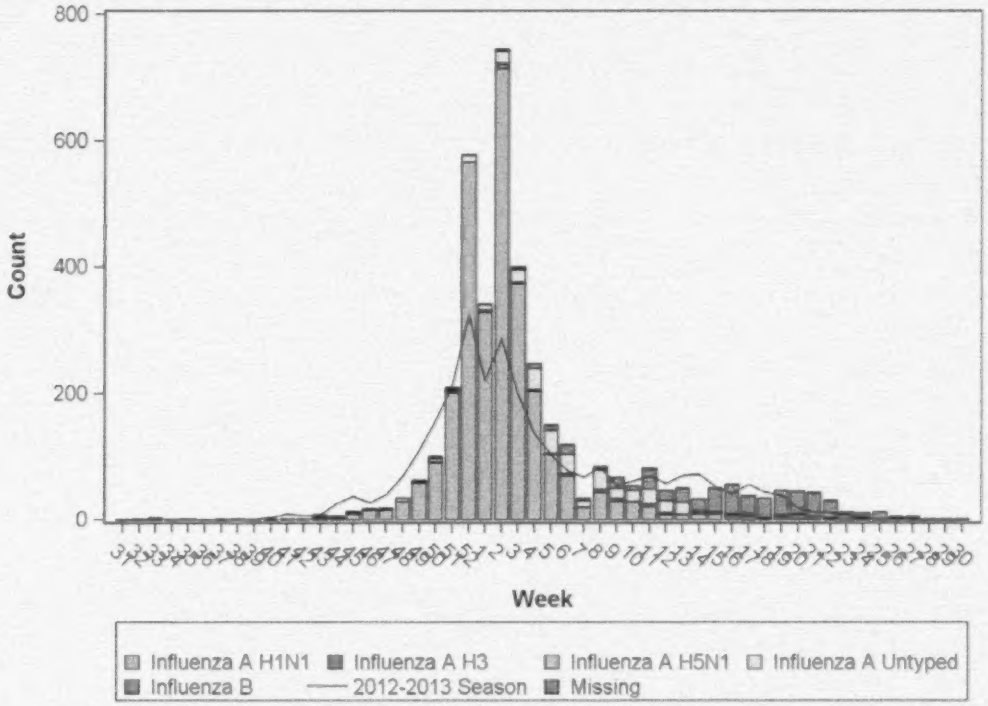
Figure 3: Per cent of patient visits due to influenza-like illness as reported by sentinel physicians, by week and season.



Source: TARRANT

Figure 4: Laboratory-confirmed cases of influenza, by subtype* and week of diagnosis.



* The Influenza A Untyped category includes samples with low viral load or unable to be typed by nucleic acid amplification test (NAAT).

** The was one case of H5N1 reported to Alberta Health in the 2013-2014 season.

Source: CDRS, Alberta Health

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Alberta Health Service Zone

Similar to last season, Edmonton Zone had the largest number of reported cases (1,368) but North Zone had the most cases per capita with a rate of 145.1 reported cases per 100,000. The epidemic curve and relative proportions of subtypes by zone were similar to the overall pattern for Alberta. Note that in contrast to the rest of the province, South Zone had fewer lab-confirmed cases in 2013-2014 than 2012-2013, however this may be a function of the unusually high rate of lab-confirmed influenza cases reported in South zone in 2012-2013.

Table 1: Rate of laboratory confirmed influenza by Zone (per 100,000)

	2013-2014		2012-2013		2011-2012	
Zone	Count	Rate	Count	Rate	Count	Rate
South Zone	237	79.7	316	108	161	55.7
Calgary Zone	997	65.9	782	53.7	294	20.8
Central Zone	620	132.2	373	81.3	152	33.6
Edmonton Zone	1,368	107.8	1,093	89.4	447	37.6
North Zone	692	145.1	327	71.2	162	36.2
Alberta Overall	3,914	97.2	2,891	74.3	1,216	32.1

Source: Communicable Disease reporting System (CDRS), Alberta Health

Age

While the largest absolute number of cases was reported in the 25-34 age group (n=602), the largest per capita rate of cases was reported in infants under one year of age and children under the age of five (Figure 5). This is to be expected given that Influenza A(H1N1)pdm09 was the dominant strain this year and the majority of children under the age of five had not been born during the 2009-2010 pandemic season. The rate of influenza in individuals age 80 or above was almost two times lower than the 2012-2013 season when Influenza A(H3N2) was the predominant subtype. The elderly are likely to have been exposed to previous waves of Influenza A(H1N1); as such, the reduced rate is believed to be due to previous immunity[11]. Indeed, the elderly were under-represented in influenza A(H1N1) cases this season: while 76 per cent of the total number of cases in Alberta had influenza A(H1N1)pdm09, only 34 per cent of cases age 80 or above had influenza A(H1N1)pdm09.

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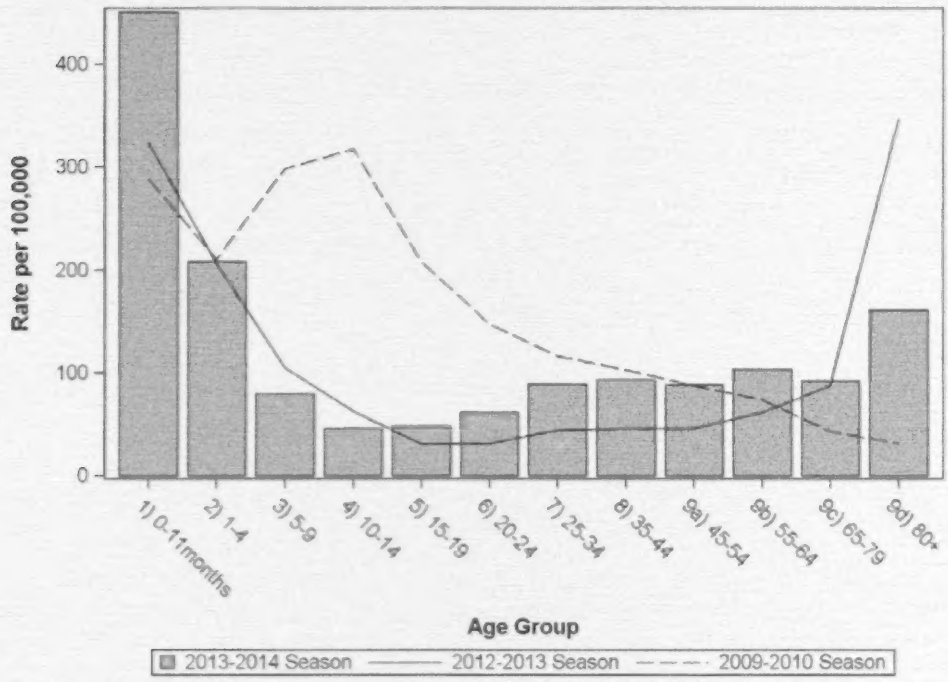
Figure 5: Rate of laboratory-confirmed influenza infections by age and season (per 100,000).



Source: CDRS, Alberta Health

Reported Outbreaks

Influenza outbreaks that occur in hospitals, residential institutions, schools, child care facilities and closed communities such as correctional facilities are reported to Alberta Health. There were 50 influenza outbreaks reported to Alberta Health this season, almost half as many as the 98 reported in the 2012-2013 season. While the number of influenza outbreaks was similar in acute care facilities and child care facilities between this season and last season, there were half as many outbreaks in long term care facilities and one-quarter the outbreaks in supportive living/home living sites (Table 2). This is likely due to the circulating strains and the differential patterns of immunity to influenza A(H1N1) between age groups. Figure 6 shows that the decrease in outbreaks in long-term care and supportive living sites was due to a decrease in influenza A outbreaks in 2013-2014.

Note also the increase in outbreaks in correctional facilities between the two seasons. While part of this may be due to increased reporting of influenza outbreaks by infection prevention and control, the incarcerated population may be more susceptible to influenza A(H1N1)pdm09 due to their age. The median age of incarcerated prisoners is lower than the median age of the population in Canada[12].

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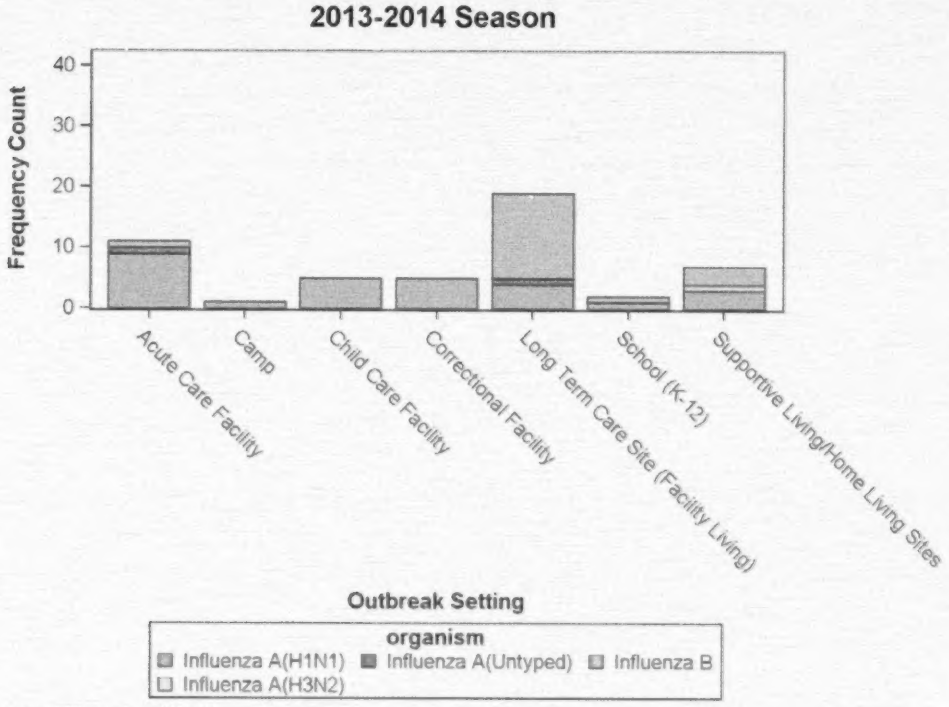
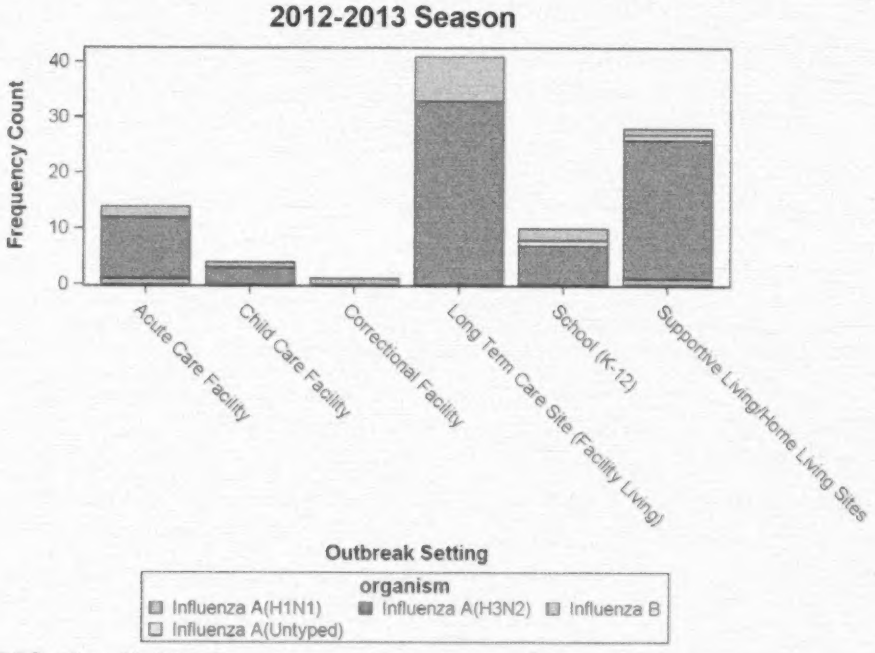
Figure 6: Count of influenza outbreaks by organism, outbreak setting, and season.



Source: CDRS, Alberta Health



Source: CDRS, Alberta Health

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Table 2: Count of outbreaks by outbreak setting and season.

	2012-2013		2013-2014	
	Count	Percent	Count	Percent
Long Term Care Facility	41	42%	19	38%
Supportive Living/Home Living	28	29%	7	14%
Correctional Facility	1	1%	5	10%
Acute Care Facility	14	14%	11	22%
Child Care Facility	4	4%	5	10%
Schools (K-12)	10	10%	2	4%
Camp	0		1	2%
Total	98		50	

Source: CDRS, Alberta Health

Hospitalized Cases

In the 2013-2014 season there were 1,219 individuals hospitalized with influenza, at a rate of 30.3 per 100,000. This is slightly higher than last season during which there were 971 hospitalizations at a rate of 25.0 per 100,000. The influenza strains isolated from hospitalized patients closely matched the strains circulating in the community.

The rate of hospitalization was closely tied to age. Infants less than one year of age had the highest rate of hospitalization (160.2 per 100,000), followed by the elderly age 80 or older (89.0 per 100,000), and children age one to four years of age (60.5 per 100,000). The rate of hospitalization varied drastically for some age groups between seasons, likely due to the circulating strains of influenza (Figure 7). The rate of hospitalization in individuals age 80 or older in 2013-2014 was less than half that in 2012-2013, but three times that of 2009-2010. The rate of hospitalization for individuals age 80 or older was 194.7 per 100,000 in 2012-2013 and 26.6 per 100,000 in 2009-2010.

In the 2013-24 season, the rate of hospitalization in adults age 25-64 was twice that of 2012-2013 season (27.0 per 100,000 in 2013-2014 compared to 13.8 per 100,000 in 2012-2013). This was clearly reflected in the age of hospitalized cases: the median age of hospitalized cases was statistically significantly lower in the 2013-2014 season (51.7 years) as compared to the median age in the 2012-2013 season (57.1 years) (Table 3). The median age of hospitalized cases in the 2009-2010 pandemic season was 34[13].

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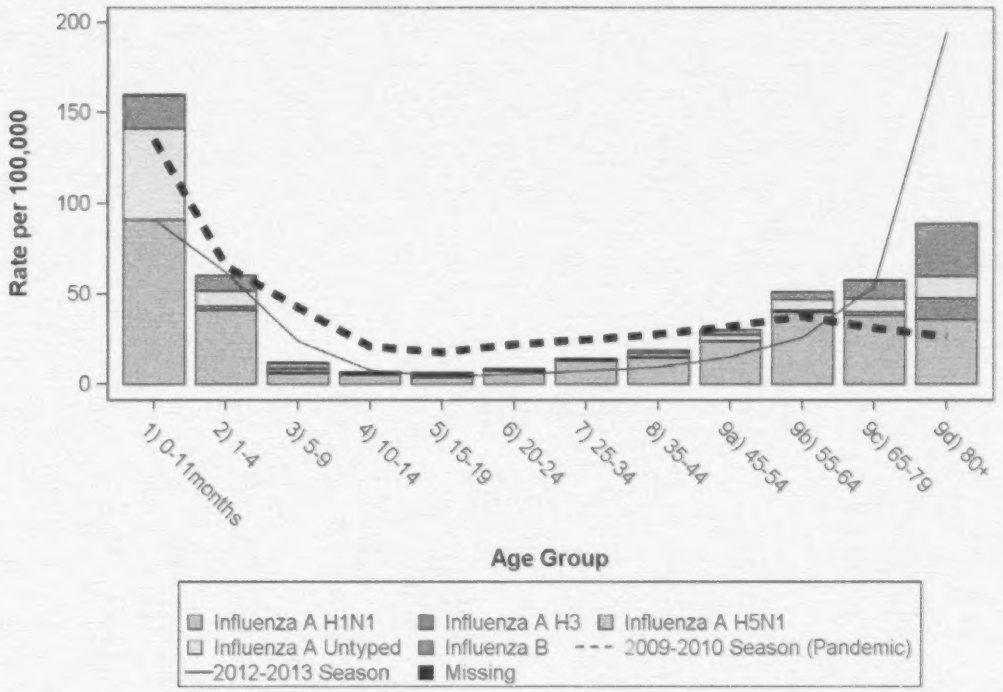
The younger demographics of influenza cases this season was reflected in ICU admissions and deaths. The median age of cases admitted to ICU in 2013-2014 was 52.1 years, statistically significantly lower than the median age of 59.4 years in 2012-2013 (Table 3). The difference in fatal cases was even higher: the median age of fatal cases was 59.4 years in 2013-2014, 15 years younger than the median age of fatal cases in 2012-2013 (74.2 years) (Figure 8). In the 2009-2010 pandemic season, the median age of cases admitted to ICU was 41 and median age of fatal cases was 50[13]. The proportion of hospitalized, ICU and fatal cases with one and more or two and more comorbidities was similar between 2013-2014 and 2012-2013 (Table 3).

Figure 7: Rate of hospitalized influenza cases by age group and season (per 100,000).



* The Influenza A Untyped category includes samples with low viral load or unable to be typed by nucleic acid amplification test (NAAT).

Source: CDRS, Alberta Health

Table 3: Characteristics of Hospitalized Cases, by Season

	2012-2013	2013-2014
No. Hospitalizations	971	1219
Median age (IQR)	57.1 (13.4-77.8)*	51.7 (25.6-64.5)*
No. cases with one or more chronic conditions (per cent)	691 (71%)	862 (70%)
No. ICU Admissions in Hospitalized Cases (per cent)	150 (15%)	206 (17%)
Median age (IQR)	59.4 (41.9-67.9)*	52.1 (37.3-61.6)*
No. cases with one or more chronic conditions (per cent)	123 (82%)	173 (84%)
No. Deaths in Hospitalized Cases (per cent)	37 (3.8%)	30 (2.5%)
Median age (IQR)	74.2 (63.3-86.9)*	59.4 (51.7-66.2)*
No. cases with one or more chronic conditions (per cent)	29 (78%)	26 (87%)

*Statistically significant difference between the seasons (P value < 0.05).
Source: CDRS, Alberta Health

Antiviral Resistance

The NML tested over 1,400 influenza viruses from across Canada (142 from Alberta) for resistance to the antiviral drugs oseltamivir, zanamivir, and amantadine[14,15,16]. Similar to last season, the vast majority of influenza A isolates were resistant to amantadine and sensitive to oseltamivir and zanamivir. Five influenza A(H1N1)pdm09 isolates were resistant to oseltamivir, one of which was isolated from Alberta (South Zone).

Conclusion

Influenza A(H1N1)pdm09 was the predominant circulating strain in the 2013-2014 season, unlike the previous season where influenza A(H3N2) was the predominant strain. The result of this was an intensive influenza season with increased illness and increased rates of hospitalization in working age adults and children under the age of five. In addition, elderly adults had half the rate of illness this season than last season and the number of outbreaks in long term care and supportive living facilities was vastly reduced. Although the overall number of fatalities and ICU admissions was similar to the previous season, the age of the cases was statistically significantly younger. This shift in age-specific disease rates with the change is predominant strain is to be expected as elderly individuals likely have residual immunity as H1N1 influenza viruses have likely circulated for the majority of influenza seasons since 1918[11].

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Appendix: 2013-2014 Influenza Season Reporting Weeks

Week	Start	End
35	August 25, 2013	August 31, 2013
36	September 1, 2013	September 7, 2013
37	September 8, 2013	September 14, 2013
38	September 15, 2013	September 21, 2013
39	September 22, 2013	September 28, 2013
40	September 29, 2013	October 5, 2013
41	October 6, 2013	October 12, 2013
42	October 13, 2013	October 19, 2013
43	October 20, 2013	October 26, 2013
44	October 27, 2013	November 2, 2013
45	November 3, 2013	November 9, 2013
46	November 10, 2013	November 16, 2013
47	November 17, 2013	November 23, 2013
48	November 24, 2013	November 30, 2013
49	December 1, 2013	December 7, 2013
50	December 8, 2013	December 14, 2013
51	December 15, 2013	December 21, 2013
52	December 22, 2013	December 28, 2013
1	December 29, 2013	January 4, 2014
2	January 5, 2014	January 11, 2014
3	January 12, 2014	January 18, 2014
4	January 19, 2014	January 25, 2014
5	January 26, 2014	February 1, 2014
6	February 2, 2014	February 8, 2014
7	February 9, 2014	February 15, 2014
8	February 16, 2014	February 22, 2014
9	February 23, 2014	March 1, 2014
10	March 2, 2014	March 8, 2014
11	March 9, 2014	March 15, 2014
12	March 16, 2014	March 22, 2014
13	March 23, 2014	March 29, 2014
14	March 30, 2014	April 5, 2014
15	April 6, 2014	April 12, 2014
16	April 13, 2014	April 19, 2014
17	April 20, 2014	April 26, 2014
18	April 27, 2014	May 3, 2014
19	May 4, 2014	May 10, 2014
20	May 11, 2014	May 17, 2014
21	May 18, 2014	May 24, 2014
22	May 25, 2014	May 31, 2014
23	June 1, 2014	June 7, 2014
24	June 8, 2014	June 14, 2014
25	June 15, 2014	June 21, 2014
26	June 22, 2014	June 28, 2014
27	June 29, 2014	July 5, 2014
28	July 6, 2014	July 12, 2014
29	July 13, 2014	July 19, 2014
30	July 20, 2014	July 26, 2014
31	July 27, 2014	August 2, 2014
32	August 3, 2014	August 9, 2014
33	August 10, 2014	August 16, 2014
34	August 17, 2014	August 23, 2014

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References

[1] World Health Organization (WHO). Review of the 2013-2014 winter influenza season, northern hemisphere. Weekly epidemiological record 2014 23(89): 245-256. Accessed July 25, 2014. www.who.int/wer/2014/en/

[2] Public Health Agency of Canada (PHAC). FluWatch Report, Weeks 27 & 28 (29 June to 12 July, 2014). Accessed July 25, 2014. www.phac-aspc.gc.ca/fluwatch/13-14/index-eng.php

[3] Laura Payton, CBC News. H5N1 bird flu death confirmed in Alberta, 1st in North America. January 8, 2014. Accessed July 25, 2014. www.cbc.ca/news/politics/h5n1-bird-flu-death-confirmed-in-alberta-1st-in-north-america-1.2489160

[4] World Health Organization. H5N1 Avian Influenza: timeline of major events. 13 December, 2011. Accessed July 25, 2014. http://www.who.int/influenza/human_animal_interface/avian_influenza/H5N1_avian_influenza_update.pdf

[5] World Health Organization. Influenza at the human-animal interface. Summary and assessment as of 27 June 2014. Accessed July 25, 2014. http://www.who.int/influenza/human_animal_interface/Influenza_Summary_IRA_HA_interface_27June14.pdf?ua=1

[6] World Health Organization. Overview of the emergence and characteristics of the avian influenza A(H7N9) virus. 31 May 2013. Accessed July 25, 2014. www.who.int/influenza/human_animal_interface/influenza_h7n9/WHO_H7N9_review_31May13.pdf?ua=1

[7] World Health Organization. China-WHO Joint Mission on Human Infection with Avian Influenza A(H7N9) Virus. 18-24 April 2013. Mission Report. Accessed July 25, 2014. www.who.int/influenza/human_animal_interface/influenza_h7n9/ChinaH7N9JointMissionReport2013u.pdf?ua=1

[8] World Health Organization. WHO Risk Assessment: Human infections with avian influenza A(H7N9) virus. 27 June 2014. Accessed July 25, 2014. www.who.int/influenza/human_animal_interface/influenza_h7n9/riskassessment_h7n9_27june14.pdf

[9] BC Centre for Disease Control. Emerging Respiratory Virus Update, June 17, 2014. Accessed July 25, 2014. www.bccdc.ca/dis-cond/DiseaseStatsReports/EmergingRespiratoryVirusUpdates.htm

[10] ILI is defined as: "Respiratory illness with acute onset presenting with fever and cough, and with one or more of – sore throat, arthralgia, myalgia, or prostration – which may be due to influenza virus." http://www.tarrantviralwatch.ca/index.php/page/about+us

[11] Monto, A.S. *et al.* Influenza pandemics: History and lessons learned. *Textbook of Influenza, 2nd edition.* 2013 Editors: Webster *et al.* John Wiley & Sons, UK.

[12] Statistics Canada. A One-Day Snapshot of Inmates in Canada's Adult Correctional Facilities. Juristat 18(8):1, Catelogue no. 85-002-XPE. June 1998. Accessed August 7, 2014. www.publications.gc.ca/collections/Collection-R/Statcan/85-002-XIE/0089885-002-XIE.pdf

[13] Government of Alberta. Pandemic (H1N1) 2009: The Alberta Experience. December 15, 2010.

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[14] National Medical Laboratory (NML). 2014 NML Oseltamivir Susceptibility Assay Completed on Influenza Isolates in Canada September 1, 2013 to July 31, 2014. Influenza and Respiratory Viruses Section, National Medical Laboratory, Public Health Agency of Canada.

[15] National Medical Laboratory (NML). 2014 NML Zanamivir Susceptibility Assay Completed on Influenza Isolates in Canada September 1, 2013 to July 31, 2014. Influenza and Respiratory Viruses Section, National Medical Laboratory, Public Health Agency of Canada.

[16] National Medical Laboratory (NML). 2014 NML Amantadine Susceptibility Assay Completed on Influenza Isolates in Canada September 1, 2013 to July 31, 2014. Influenza and Respiratory Viruses Section, National Medical Laboratory, Public Health Agency of Canada.

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